

Research on Mathematics Education

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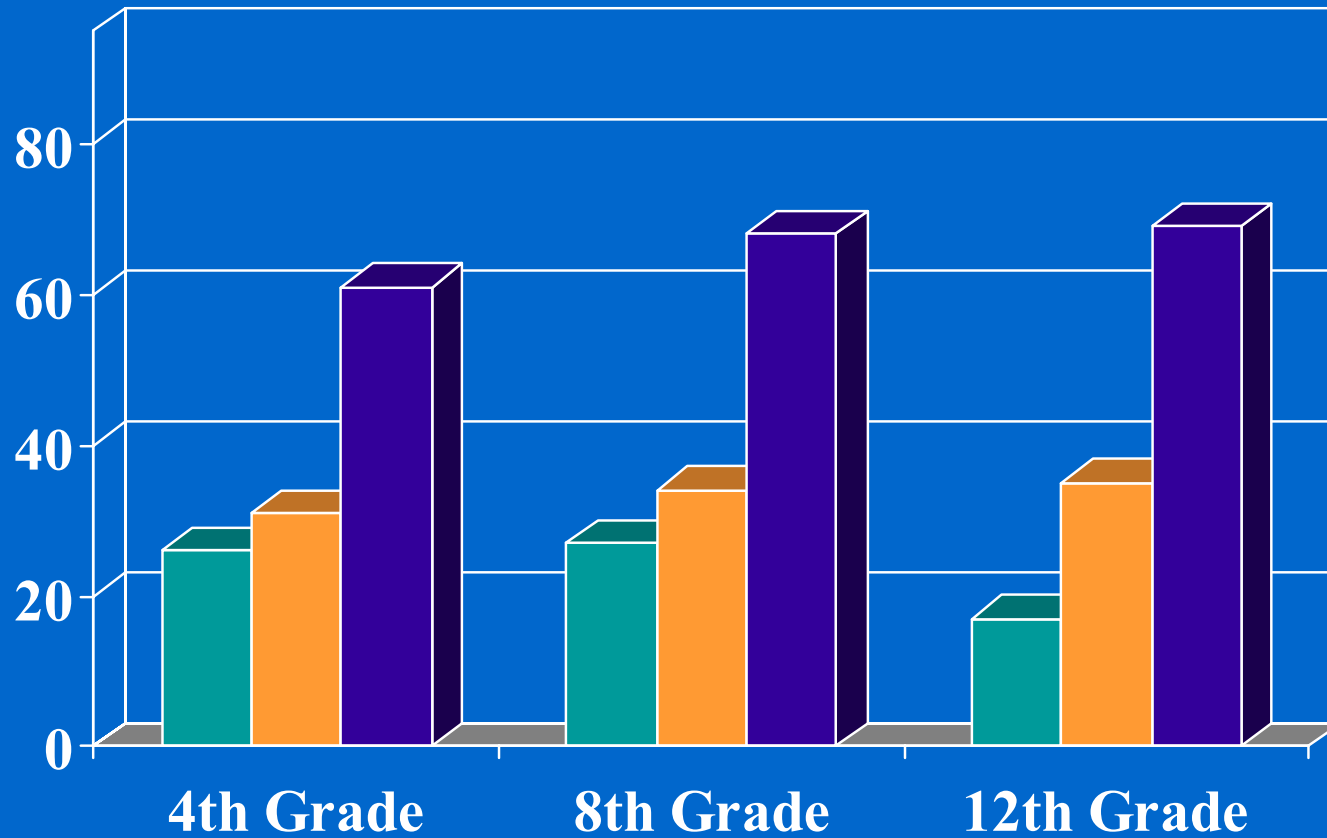


Achievement

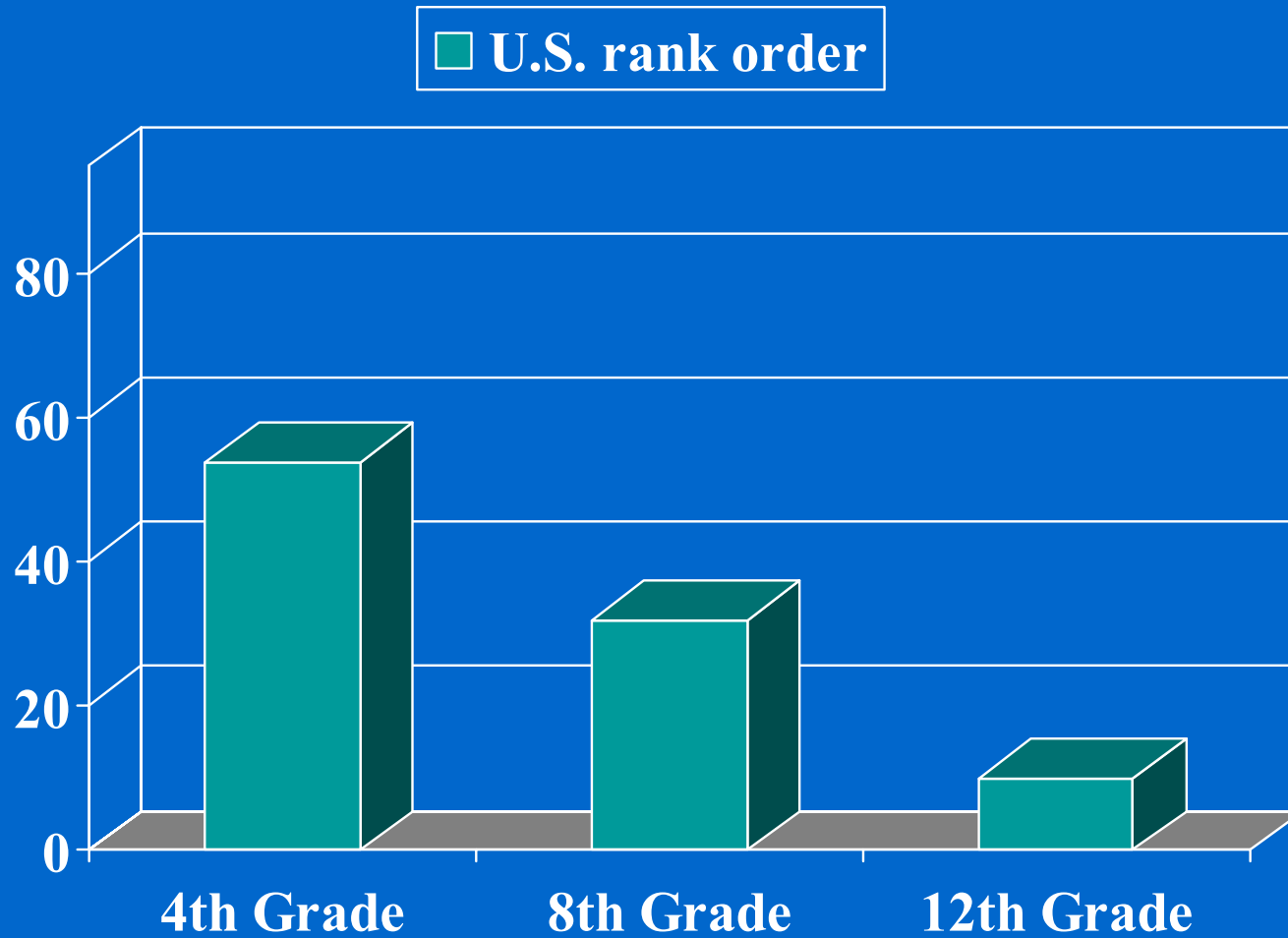


NAEP 2000 Proficiency

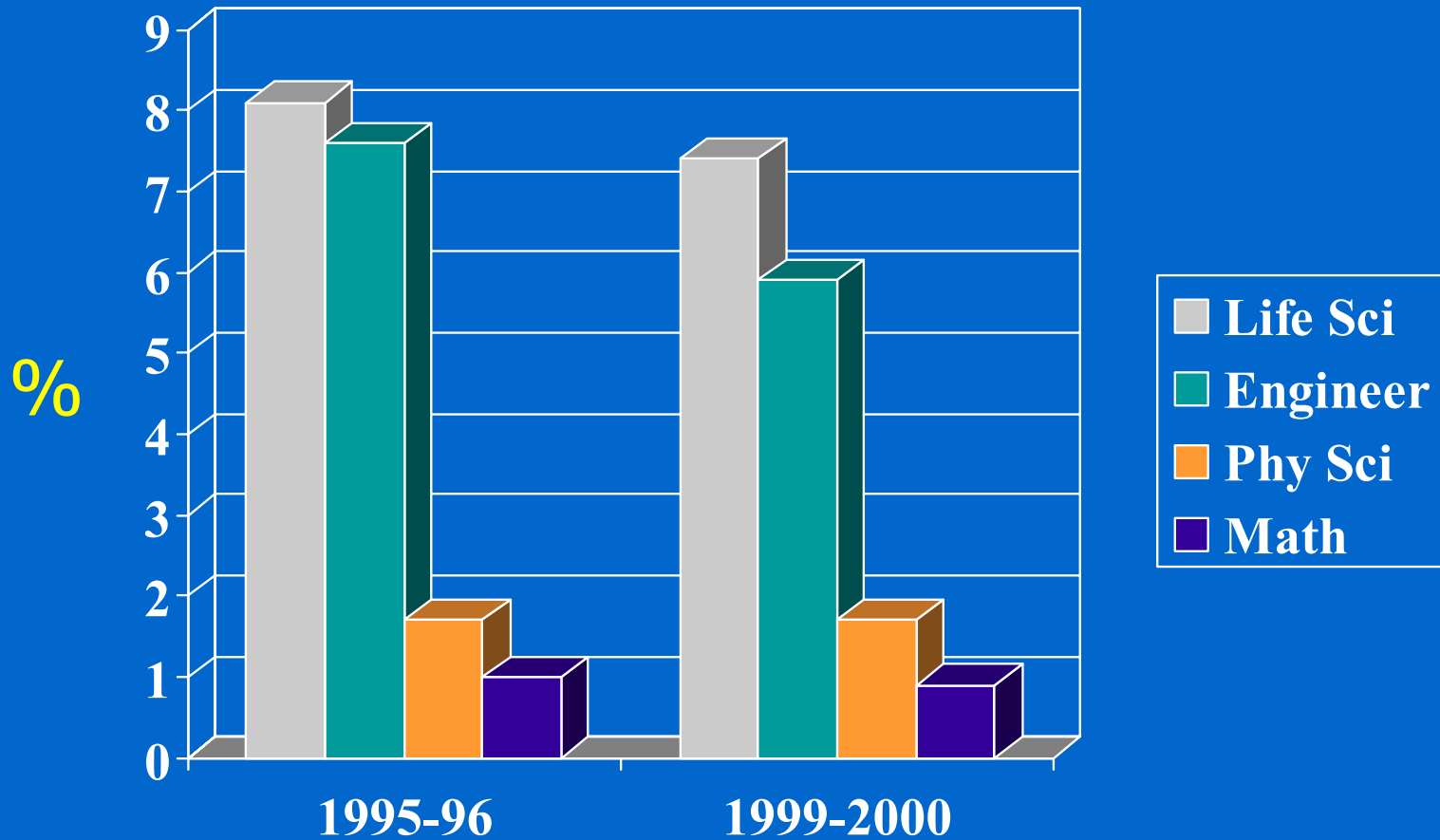
Proficient Below Basic Below Basic Af Am



TIMSS Math 1995



Declared Major 4-year colleges





Tracking and Grouping





Assessment for Instruction





Structured Peer Feedback



The Math Wars

Constructivist Approaches	Skills-based Approaches
Knowledge is constructed	Knowledge is imparted
Children should develop their own understanding	Children should master standard facts & concepts
Authentic problems	Skill-relevant problems
Intrinsically motivated	Extrinsically motivated



Conceptual Understanding



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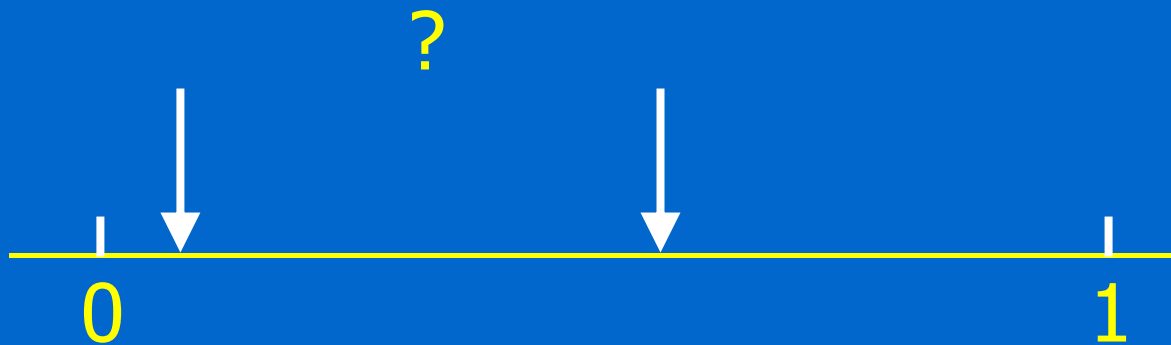
Decimal Fractions

$$509 > 7$$

$$.509 < .7$$

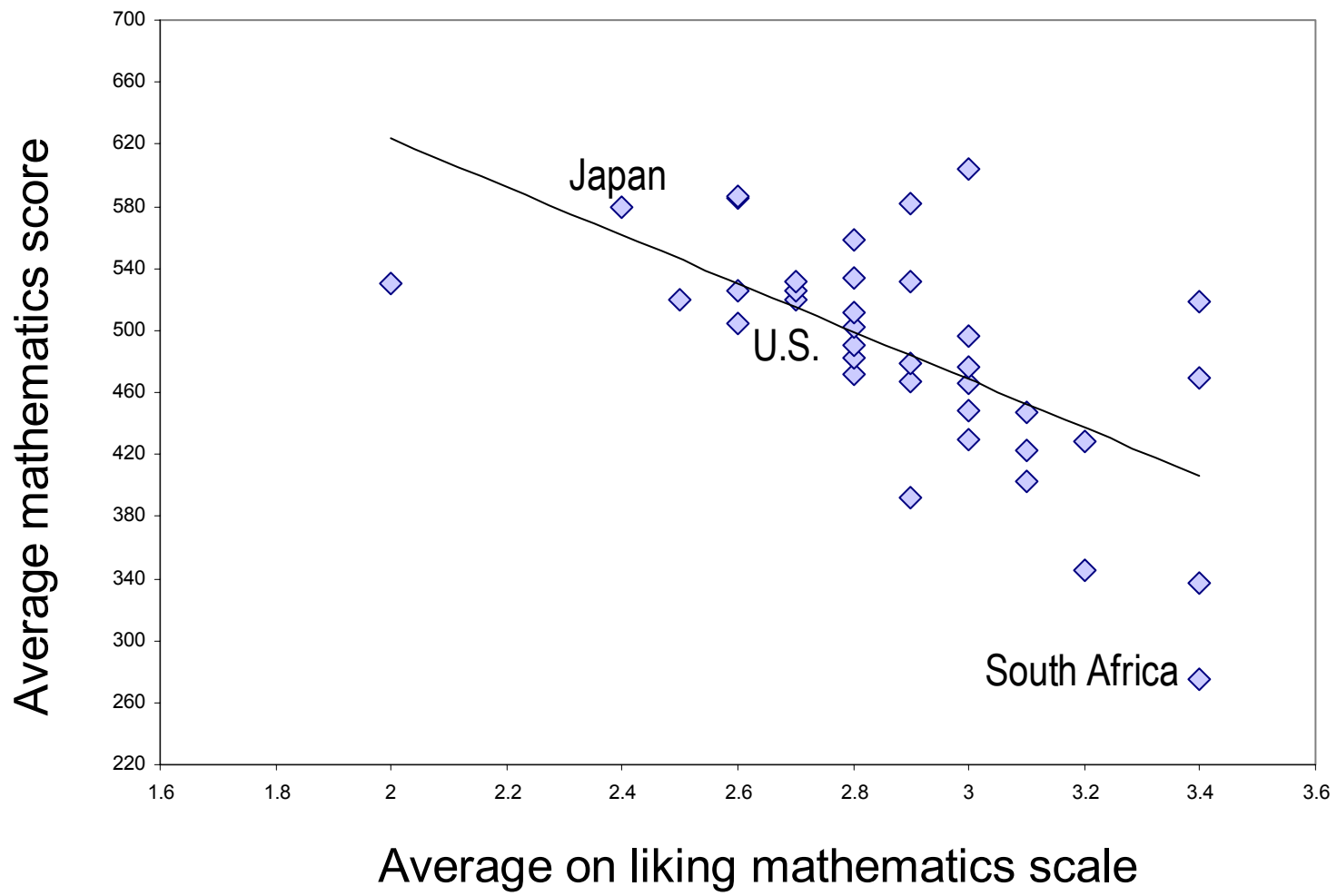
Decimal Fractions

0.509



Checks on Constructivism

- Many routes to understanding
- Limits on working memory
- Inefficiency of discovery
- Role of work in learning

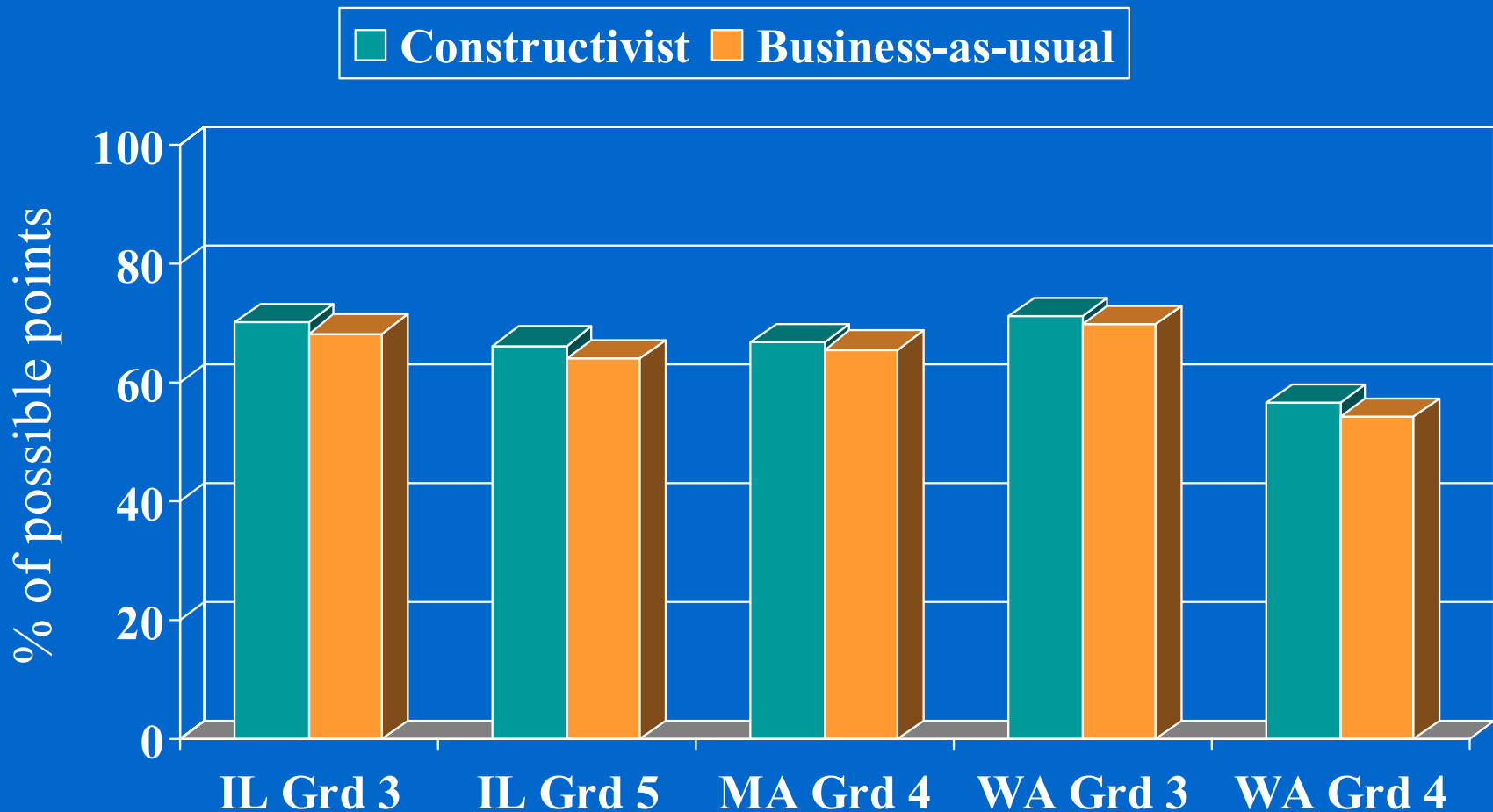




Curriculum



Constructivist Math – 3 States





Implementation



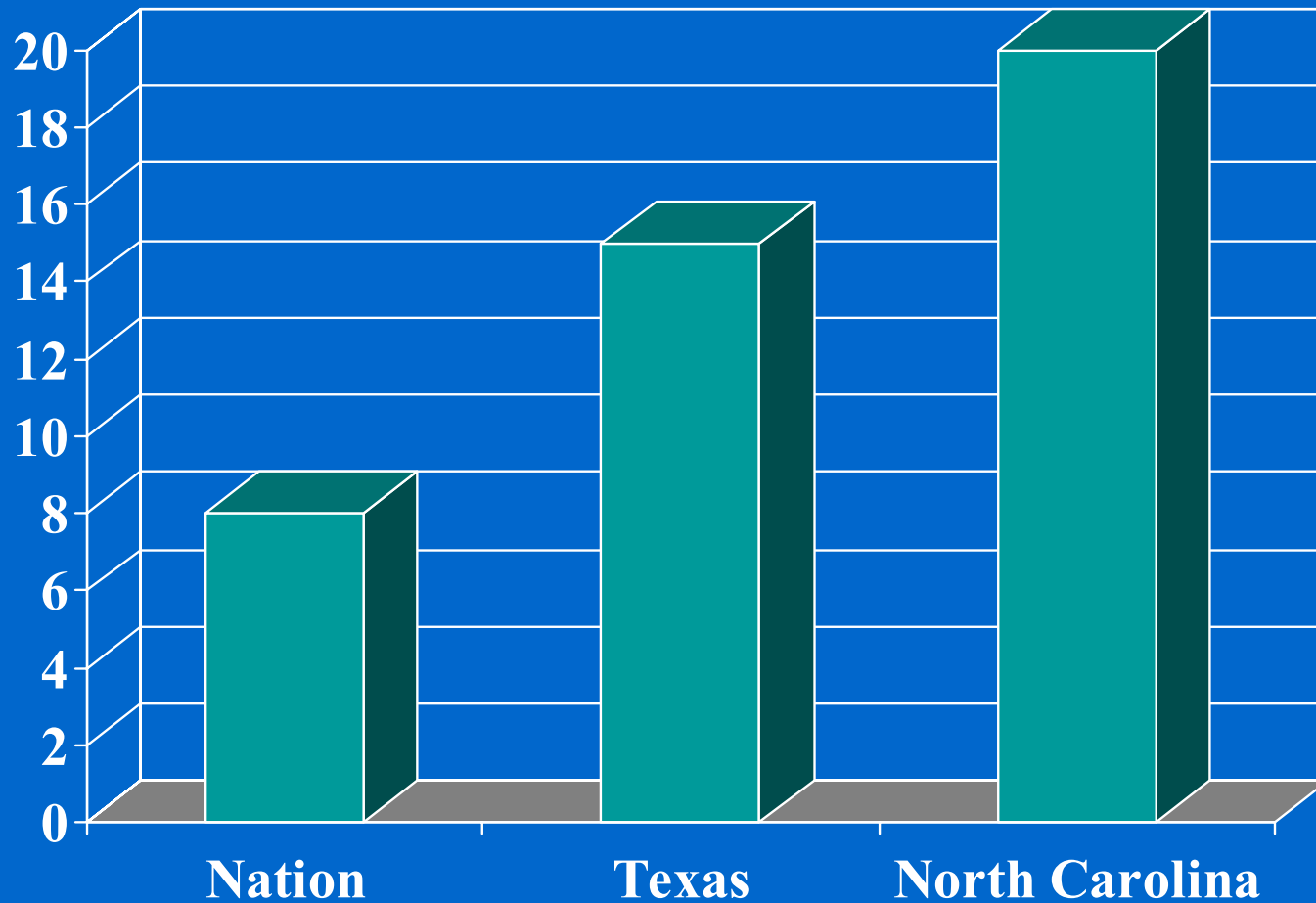




Alignment



NAEP



4th Grade Math Gains: 1992 to 2000

Elements of State Math Reforms

- State-wide standards
- Linked state-wide assessments
- Accountability for results



Putting It Together



Classroom-based assessment	+
Structured peer feedback	+
Tracking	-
Understanding	+
Direct instruction	+ - ?
Discovery	+ - ?
Authentic problems	+ - ?
Work and practice	+
Curriculum	?
Implementation	+
System alignment	+